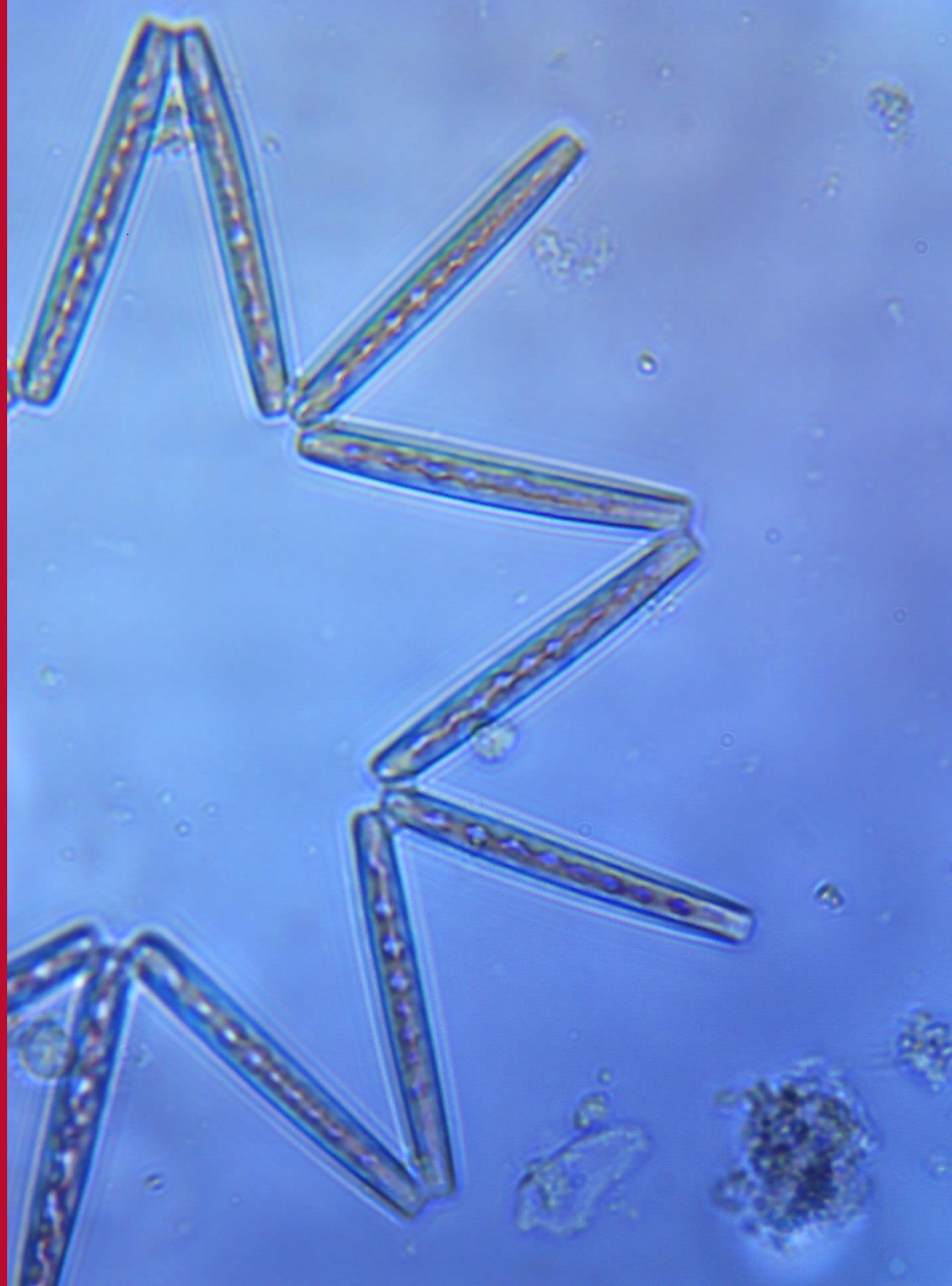
Coastal Issues: Hazardous Algal Blooms

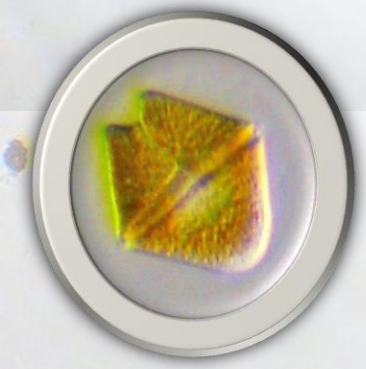
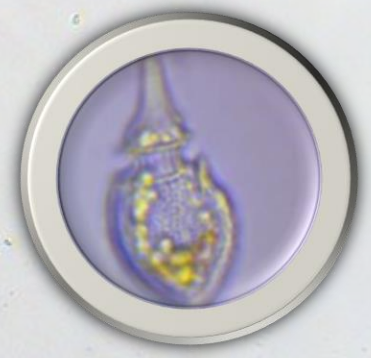
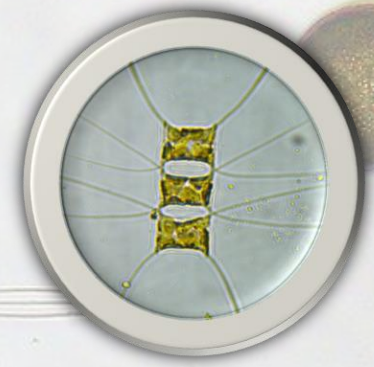
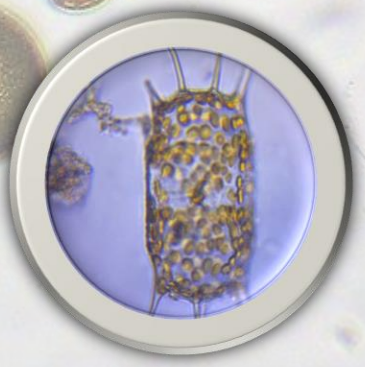
Phytoplankton Monitoring Network



Marine Extension and Georgia Sea Grant
UNIVERSITY OF GEORGIA
Sea Grant

The players

- Phytoplankton
  - Phyto = plant-like
  - Producers – photosynthesis
  - Unicellular organisms
  - Diatoms vs Dinoflagellates

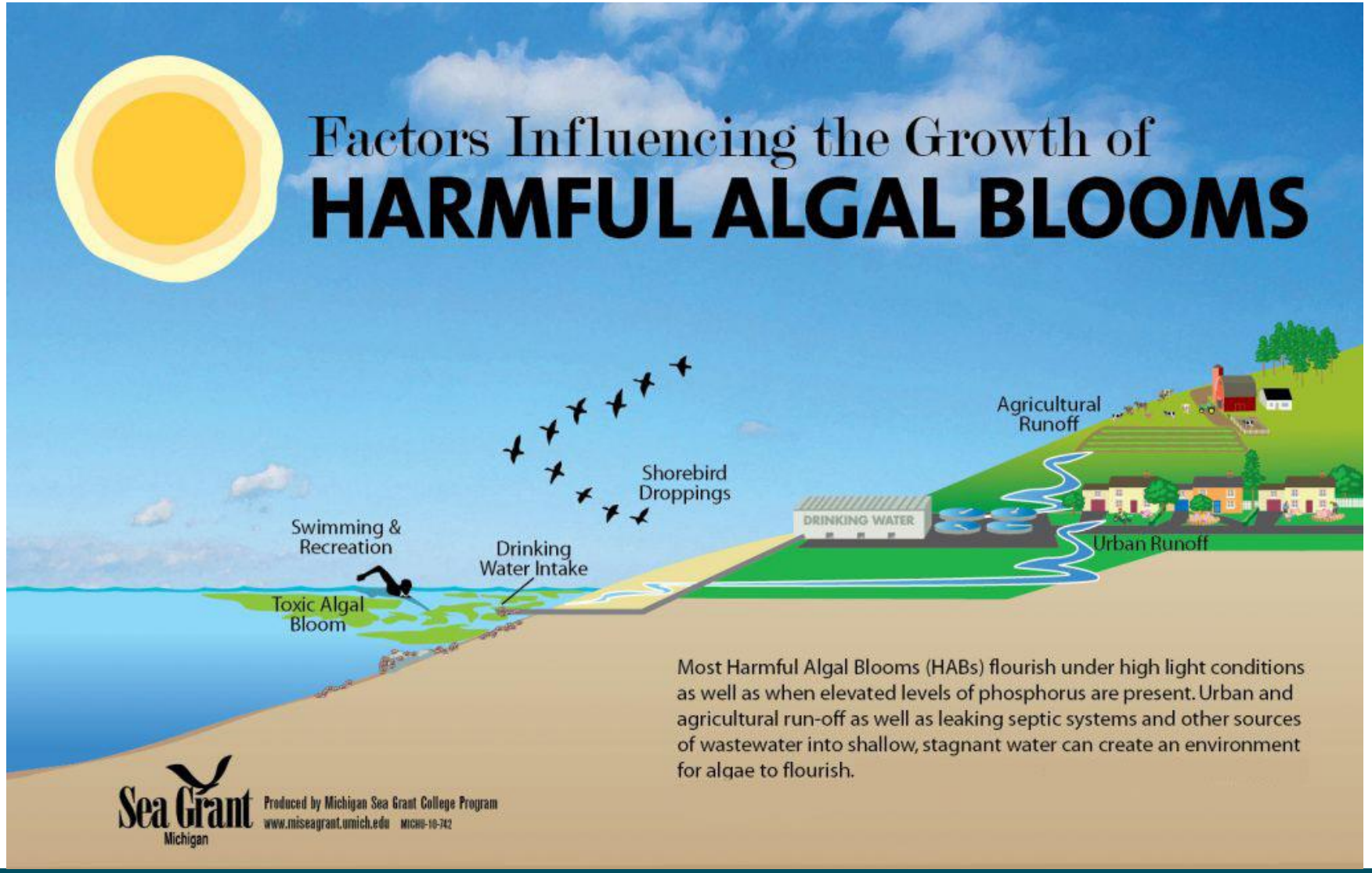





Phytoplankton: small but mighty

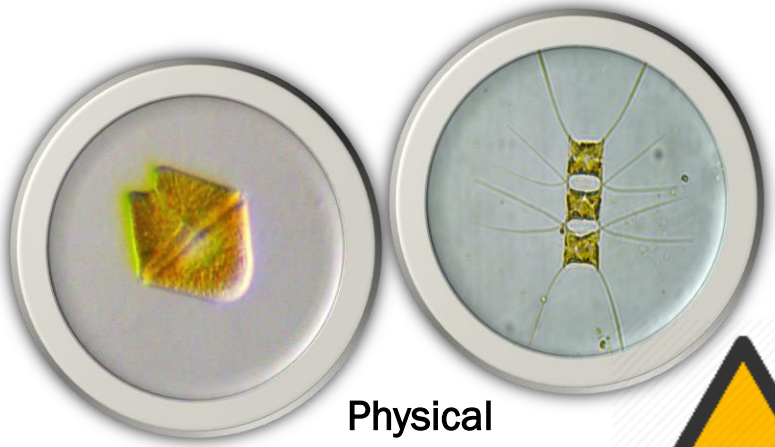
- Produce >50% of all O_2 on planet
- Responsible for transferring CO_2 from the atmosphere and even affect cloud formation*
- Base of the food chain
- Base of many products

* Pomeroy, Ross. (July 17, 2015) *How Plankton Produce Clouds.* realclearscience.com

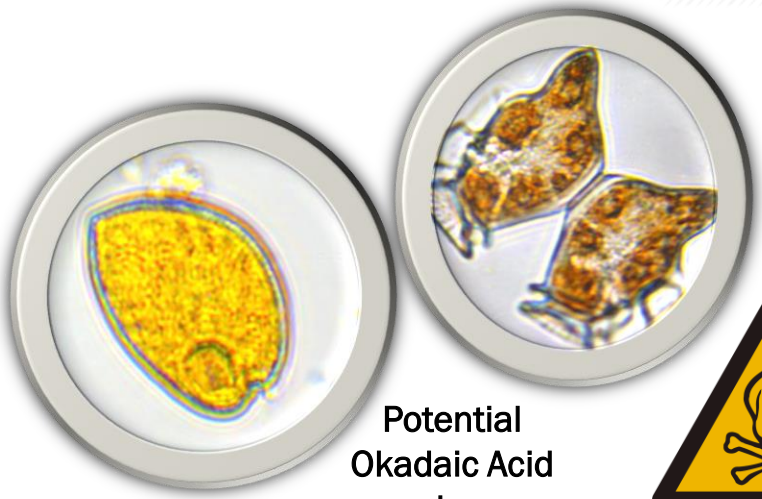
Bloom and Bust: too much of a good thing



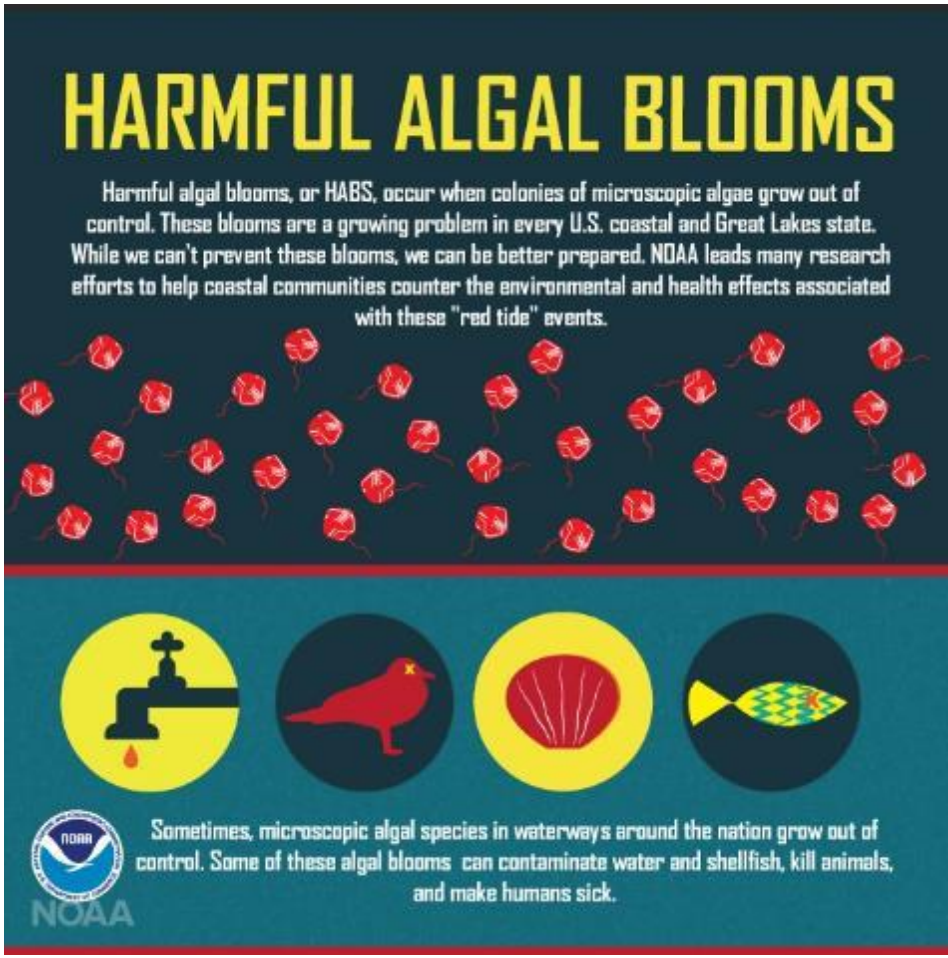
Phytoplankton Monitoring Network (PMN)

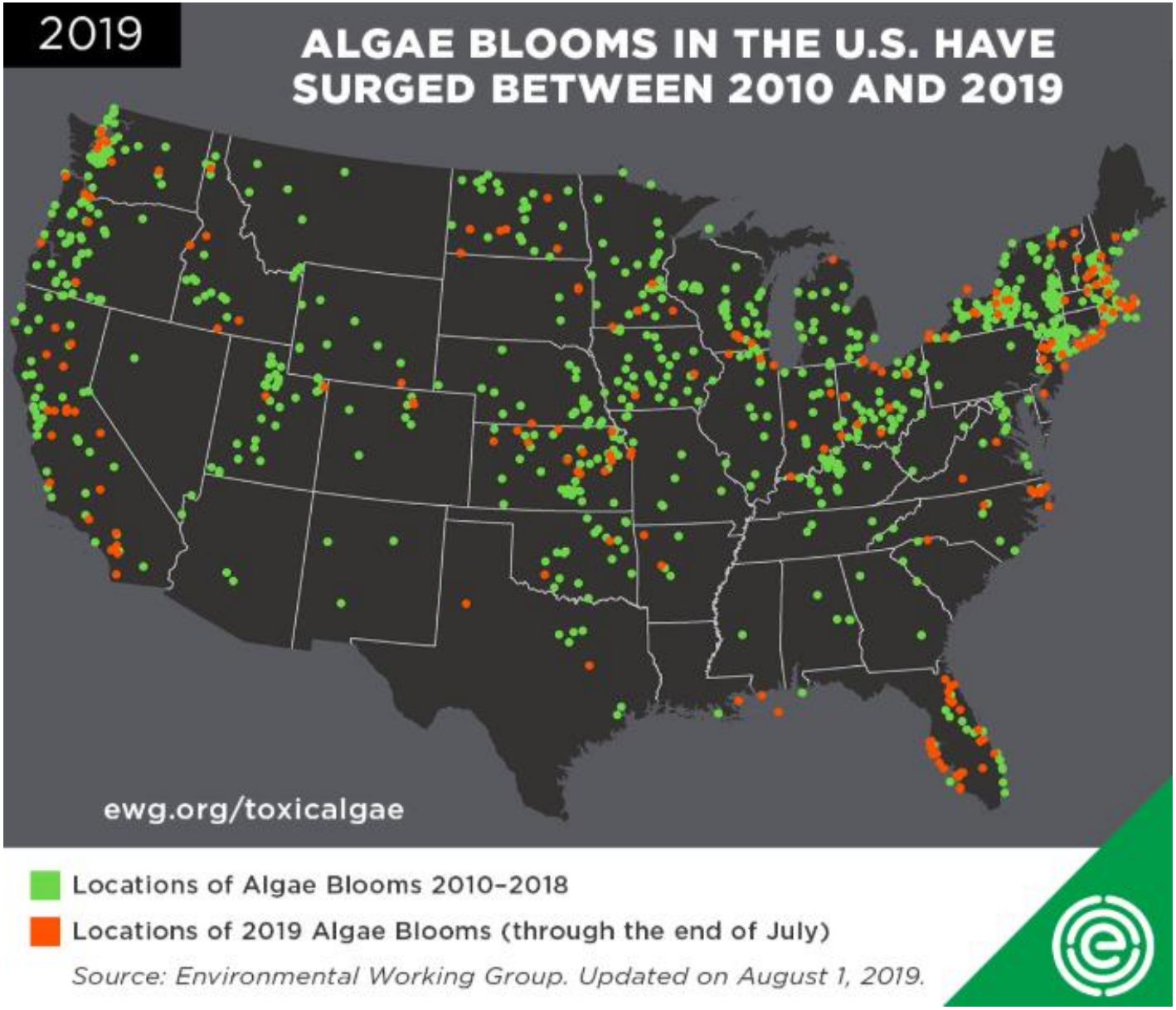


Physical Damage



Potential Okadaic Acid producers




2019
ALGAE BLOOMS IN THE U.S. HAVE SURGED BETWEEN 2010 AND 2019
ewg.org/toxicalgae
Locations of Algae Blooms 2010–2018
Locations of 2019 Algae Blooms (through the end of July)
Source: Environmental Working Group. Updated on August 1, 2019.

PHYTOPLANKTON MONITORING NETWORK

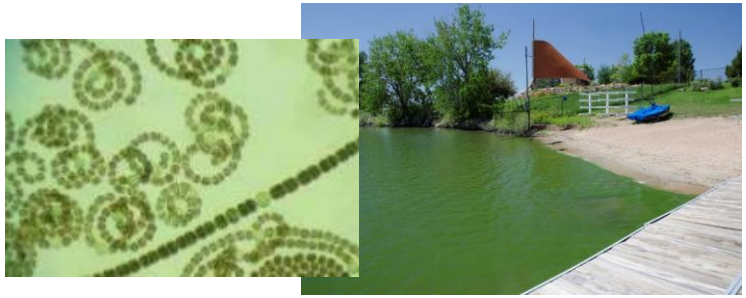
NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

Science Serving Coastal Communities

To educate the public on harmful algal blooms (HABs) while expanding the knowledge of phytoplankton that exist in coastal waters through research based monitoring.

- PMN started in 2001 as part of Marine Biotoxins Program in Charleston, SC
- Over 60 active sites in 12 coastal states

- Freshwater CyanoHAB started in 2015 as interagency agreement with EPA Office of Water
- 47 sites in 18 states



Materials supplied to PMN participants

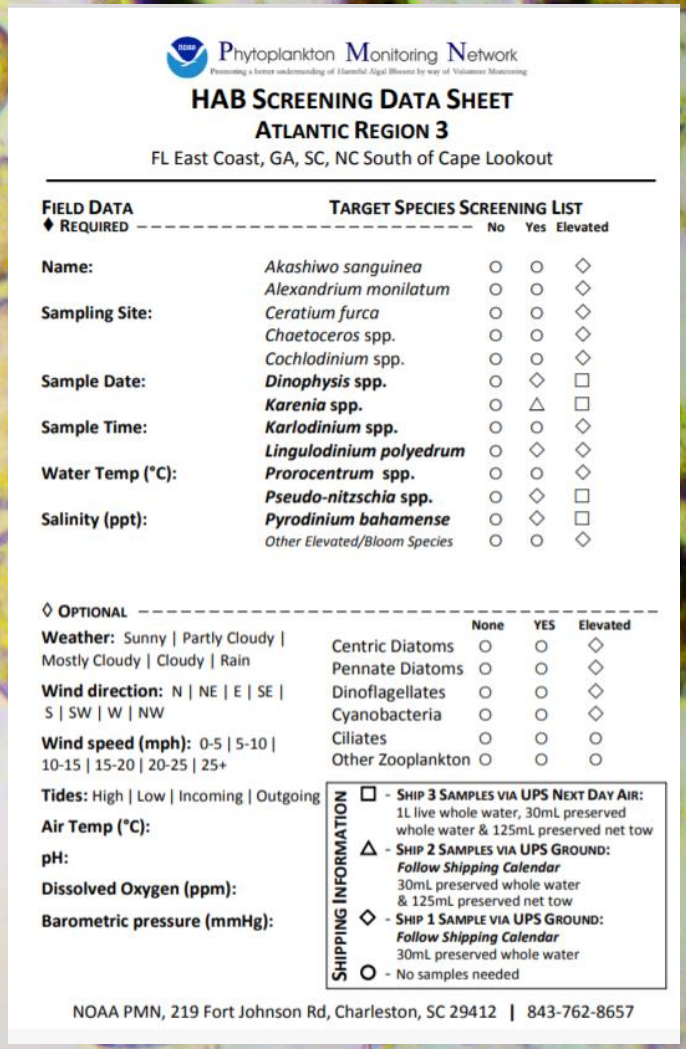
Equipment

- Refractometer and thermometer
- 20 µm plankton net (marine)
- Gridded slides
- ID sheets and info on target HAB species
- Shipping supplies with pre-paid UPS shipping labels

Data taken and samples

- Date, tidal phase, salinity, wind direction, weather, water temp, ambient temp
- Species found, dominant community
- Abundance (No, Yes, Elevated)
- QA photos taken of ALL target species found

- Sample preserved and sent in depending on target organism
- Samples double checked for cell count and toxicity



Phytoplankton Monitoring Network

HAB SCREENING DATA SHEET

ATLANTIC REGION 3

FL East Coast, GA, SC, NC South of Cape Lookout

FIELD DATA ♦ REQUIRED

Name:

Sampling Site:

Sample Date:

Sample Time:

Water Temp (°C):

Salinity (ppt):

TARGET SPECIES SCREENING LIST

	No	Yes	Elevated
Akashiwo sanguinea	○	○	◇
Alexandrium monilatum	○	○	◇
Ceratium furca	○	○	◇
Chaetoceros spp.	○	○	◇
Cochlodinium spp.	○	○	◇
***Dinophysis* spp.**	○	◇	□
***Karenia* spp.**	○	△	□
***Karlodinium* spp.**	○	○	◇
Lingulodinium polyedrum	○	◇	◇
***Prorocentrum* spp.**	○	○	◇
***Pseudo-nitzschia* spp.**	○	◇	□
Pyrodinium bahamense	○	◇	□
Other Elevated/Bloom Species	○	○	◇

◊ OPTIONAL

Weather: Sunny | Partly Cloudy | Mostly Cloudy | Cloudy | Rain

Wind direction: N | NE | E | SE | S | SW | W | NW

Wind speed (mph): 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25+

Tides: High | Low | Incoming | Outgoing

Air Temp (°C):

pH:

Dissolved Oxygen (ppm):

Barometric pressure (mmHg):

	None	YES	Elevated
Centric Diatoms	○	○	◇
Pennate Diatoms	○	○	◇
Dinoflagellates	○	○	◇
Cyanobacteria	○	○	◇
Ciliates	○	○	○
Other Zooplankton	○	○	○

SHIPPING INFORMATION

□ - **SHIP 3 SAMPLES VIA UPS NEXT DAY AIR:** 1L live whole water, 30mL preserved whole water & 125mL preserved net tow

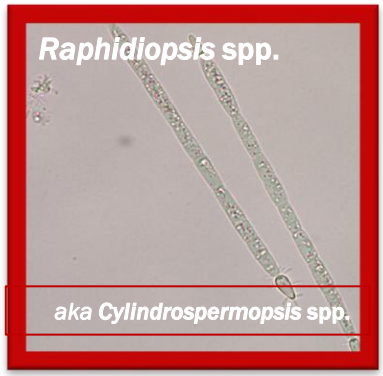
△ - **SHIP 2 SAMPLES VIA UPS GROUND:** ***Follow Shipping Calendar*** 30mL preserved whole water & 125mL preserved net tow

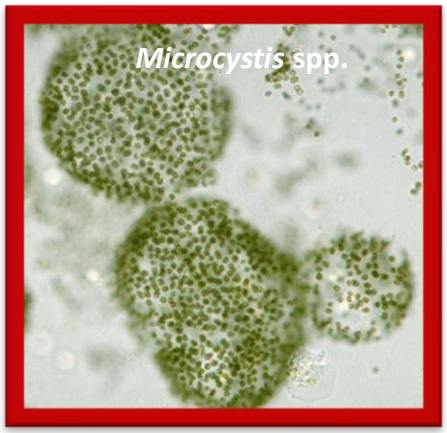
◇ - **SHIP 1 SAMPLE VIA UPS GROUND:** ***Follow Shipping Calendar*** 30mL preserved whole water

○ - No samples needed

NOAA PMN, 219 Fort Johnson Rd, Charleston, SC 29412 | 843-762-8657

Target Freshwater Algae





Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring, and management, World Health Organization, 1999

Monitoring Results:

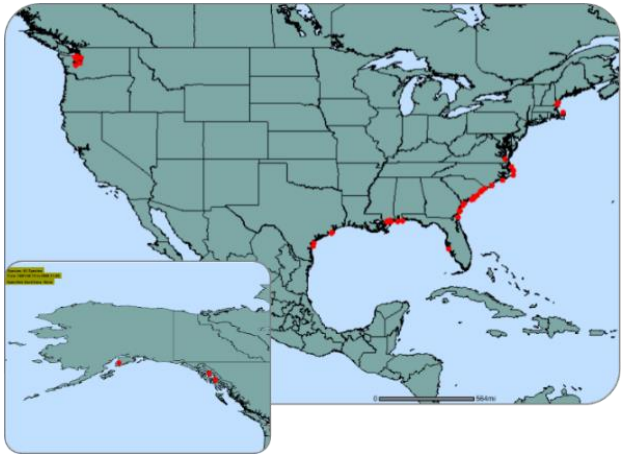
Marine (2001-2019)

Volunteer Reported Blooms > 200

Potentially toxic species= 57

Confirmed toxic events = 14

- 9 Domoic Acid (TX, MS, NC, AK)
- 1 Okadaic Acid (TX)
- 2 Saxitoxin (AK)
- 1 Microcystin (MS)



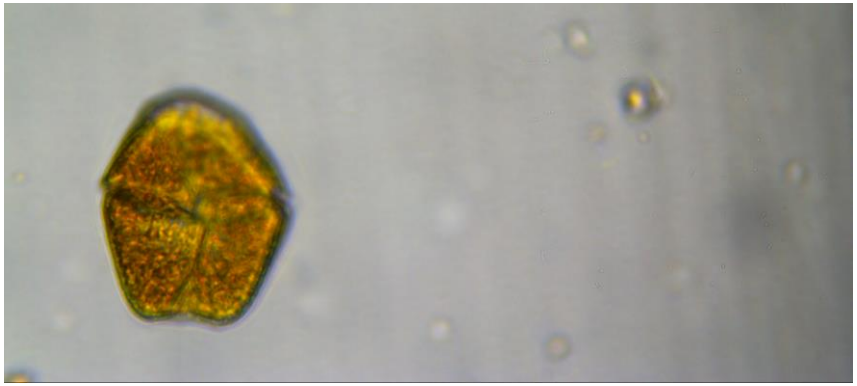
Freshwater (2016-19)

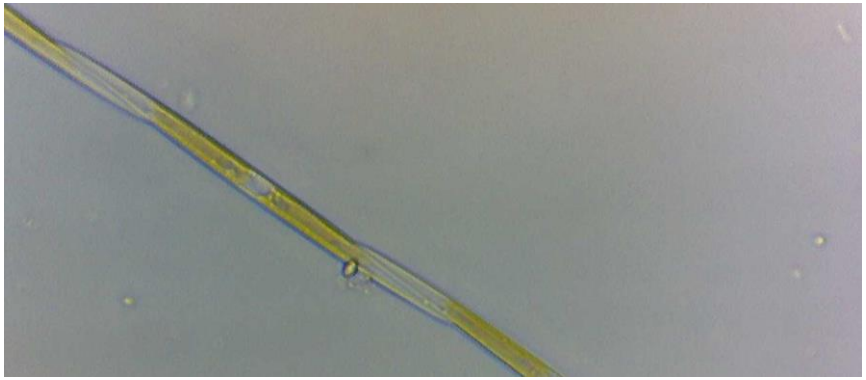
Volunteer Reported Blooms = 37

Confirmed toxic events = 9

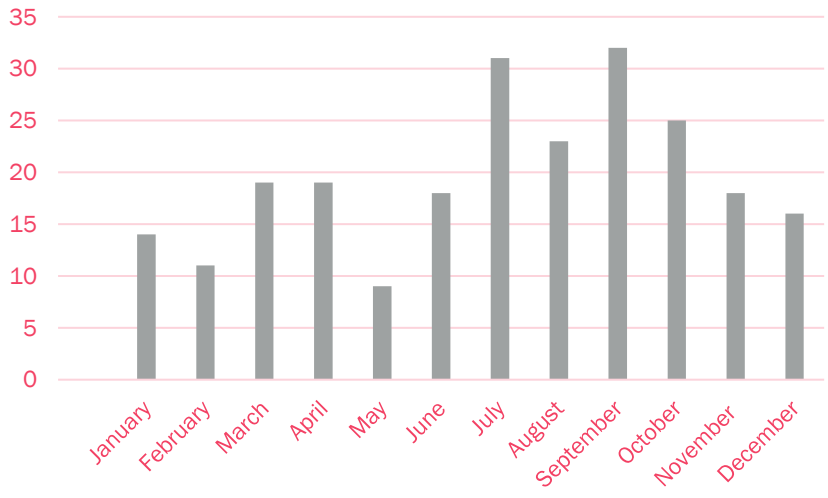
- Microcystis (ID, MI/OH, MN)
- Aphanizomenon (ND)
- Dolichospermum (GA, ID, CO)

Base line data

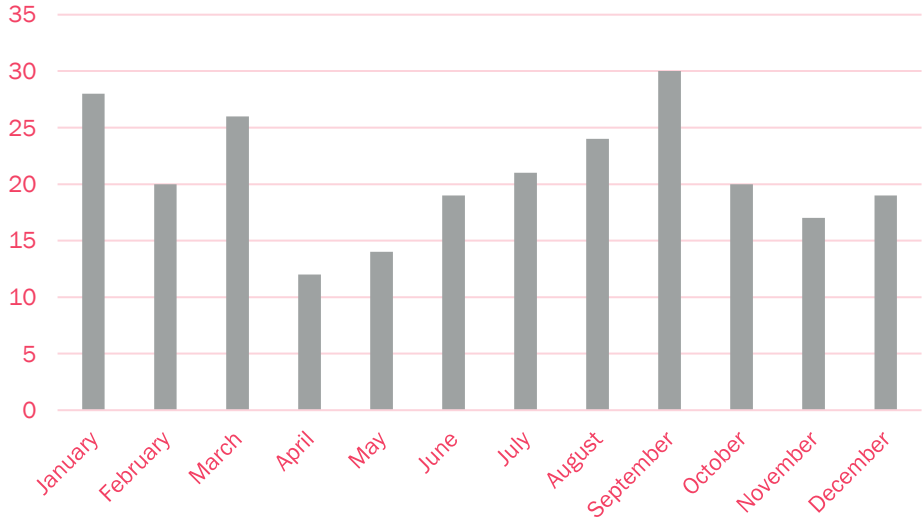




Akashiwo sanguinea



Pseudo-nitzschia spp.



Hidden Agenda

Have fun

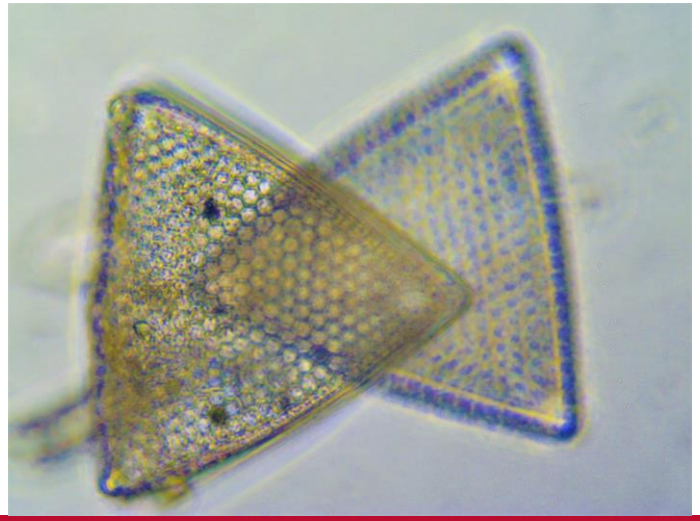
Socialize

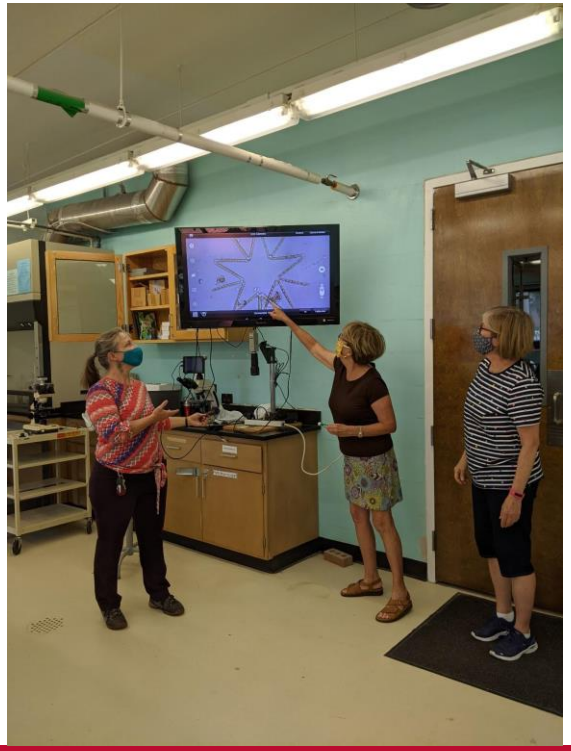
Be the best phytoplankton identifiers possible!

Support each other

Take nice photos

Keep learning





For More Information

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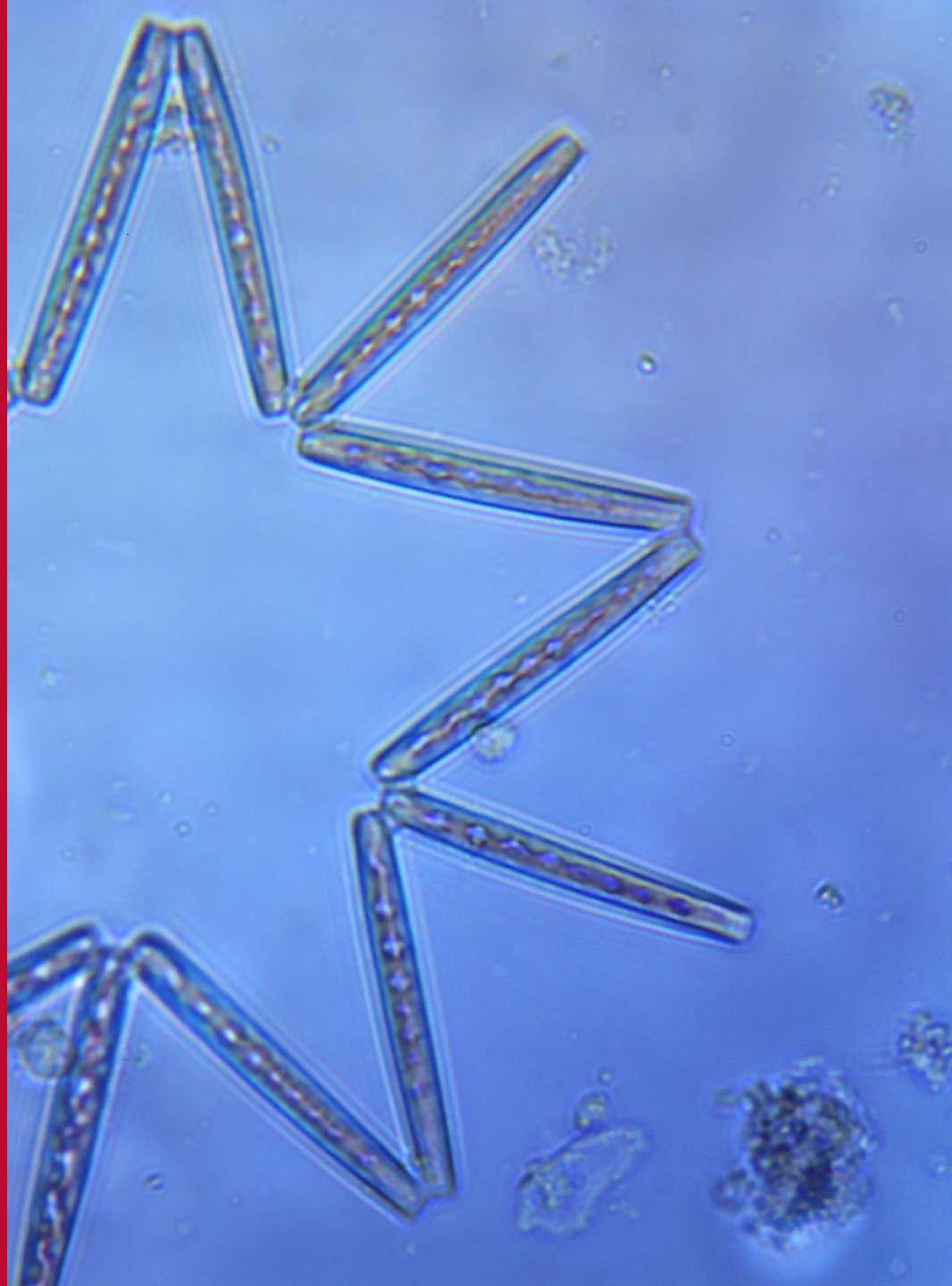
Links:
https://coastalscience.noaa.gov/research/stressor-impacts-mitigation/pmn/- PMN website
http://youtu.be/ItzxoB06De0- Phyto app demo

Coastal Issues

Questions???



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